

广西百色和永乐盆地的始新世猪类化石

——兼论早期猪类的分类和演化¹⁾

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摘要 描述了广西百色及永乐盆地发现的中始新世最晚期—晚始新世的猪类化石。这批已知最早的猪超科化石,大大丰富了亚洲地区的早期猪类,对了解全球猪类的早期演化有着重要价值。广西的材料被确定为两个新属新种:萨氏始新猪 *Eocenchoerus savagei* 和广西华夏猪 *Huaxiachoerus guangxiensis*, 一个新种:粗壮暹罗猪 *Siamochoerus viriosus* 和一个未定属种: *Tayassuidae* gen. et sp. indet.。加上已发表的单尖旅猪 *Odiochoerus uniconus*, 百色、永乐盆地共计发现了 5 种始新世猪类化石。新属 *Eocenchoerus* 虽然臼齿结构简单,与原始的古猪类 (palaeochoerid) 接近,但因其 M3 具有一个明显的跟座而被归入猪科。早期猪科动物非常原始的臼齿形式证明,猪科动物的起源并不晚于古猪科 (Palaeochoeridae) 和西猪科 (Tayassuidae)。旧大陆的古猪类长期以来被认为与新大陆的西猪类 (tayassuid) 更为接近,多数学者将其归入西猪科。笔者认为两者共有的近祖特征,并不能支持它们更近的亲缘关系,而且古猪类缺乏典型西猪类的近裔特征,因而支持将 Palaeochoerinae 亚科作为一个独立的 Palaeochoeridae 科,并将发现的两个新属种 *Huaxiachoerus guangxiensis* 和 *Siamochoerus viriosus* 归入该科。西猪类材料的发现,再次肯定了东南亚地区确实存在与新大陆典型西猪类如 *Perchoerus*, 相似的古老猪类,另外新属 *Huaxiachoerus* 在臼齿结构上也显得比其他古猪类更接近新大陆的 *Cynorca*。如果 *Perchoerus* 和 *Cynorca* 确属新大陆西猪类两个演化支系的祖先类型,那么新大陆的猪类动物很可能源于旧大陆。鉴于百色、永乐盆地的猪类已发生了较大分异,猪类动物的分化似应不晚于中始新世。

关键词 广西, 百色盆地、永乐盆地, 始新世, 猪类, 分类, 演化

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EOCENE SUIDS (ARTIODACTYLA, MAMMALIA) FROM BOSE AND YONGLE BASINS, CHINA, AND THE CLASSIFICATION AND EVOLUTION OF THE PALEOGENE SUIDS

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Abstract The earliest fossil suid collection of the world from Guangxi, China, is identified as four taxa. *Eocenchoerus* gen. nov. is assigned to Suidae based primarily on the presence of a talon on M3. The Eocene suid indicates that the origin of Suidae is as early as that of Palaeochoeridae and Tayassuidae. The family Palaeochoeridae is accepted to group the Old World palaeochoerids, *Siamochoerus viriosus* sp. nov. and *Huaxiachoerus guangxiensis* gen. et sp. nov. are included in it, and *Huaxiachoerus* is considered close to *Cynorca*. A single upper molar is identified as a tayassuid, and is close to the typical tayassuid *Perchoerus*. If *Cynorca* and *Perchoerus* are indeed the root members of the two major evolutionary radiation of the New World tayassuids, the New World tayassuids should evolve from their Old World ancestors. The diversified suid group in the Asian Late Eocene suggests the split of Suidae, Palaeochoeridae and Tayassuidae might begin at the Middle Eocene or earlier period.

Key words Bose and Yongle basins, Guangxi, Eocene, suid, classification, evolution

1 Introduction

The living members of the Suidae (pigs) and Tayassuidae (peccaries), characterized by possessing bunodont cheek teeth and occupying similar ecological niche in the Old and New World, are generally considered as sister-group (Gentry and Hooker, 1998). However the scarcity of fossil records made the early history of these groups still obscure. For a long time, the study of their evolution has been based on the European and American fossil collections, which were more intensively investigated than those in Asia. Europe has been thought to be the center of evolution and diversity of suoids based on the fact that the most primitive group, palaeochoerids, were found therein (Ginsburg, 1974; Pickford, 1988; Hellmund, 1992). Although most paleontologists agreed that palaeochoerid represents the stem group of suoids, its systematic position remains uncertain, either being assigned to the Suidae, or to the Tayassuidae according to different authors (Pickford, 1988; Van der Made, 1990, 1994). Even a family name, Palaeochoeridae, has been proposed for it (Van der Made, 1996, 1997, 1998). Discovery of more fossils of early age is thus very important to

solve the discrepancy. As early as in 1970's, some Eocene suoid teeth were found from Bose and Yongle Basins, China. Unfortunately, they were only reported as two peccary species A and B (Tang et al., 1974; Xu, 1982). In 1983, some more suoid teeth from the same basins were collected, and D. E. Savage, Zhai Renjie and Tong Yongsheng et al. described them in their unpublished manuscript. Tong and Zhao (1986) described a mandible found later from the same area, and named the earliest known Eocene suoid *Odiochoerus uniconus* in the world (in the original paper, the suggested age for the specimen was early Oligocene). Nonetheless, the poor Asian Paleogene record did not attract much attention among paleontologists until the discovery of suoid fossils from the Late Eocene of Thailand (Ducrocq, 1994; Ducrocq et al., 1998), which made specialists to realize that the Asian Paleogene suoids were more diversified than previously thought, and that the Southeastern Asia was probably the origin area of suoids (Ducrocq, 1994; Ducrocq et al., 1998; Liu et al., in press). Therefore the restudy of the unpublished Eocene fossils from southern China becomes particularly desirable.

Bose and Yongle basins are located in the west of Guangxi Province. Chow (1957) first studied mammal fossils from these basins and correlated them to the latest Eocene fauna from Pondaung sandstone in Burma. In 1973, a field team from the Institute of Vertebrate Paleontology and Paleoanthropology, Chinese Academy of Sciences (IVPP) collected numerous vertebrate fossils from the two basins, and divided the sediments into the Dongjun, Naduo (= Nadu) and Gongkang Formations, ranging from bottom up. Based on mammal fossils, the Dongjun Fauna was considered as of Late Eocene, the Nadu of Latest Eocene, and the Gongkang of the Early Oligocene in age (Tang et al., 1974). More recently, Tong (1989), Tong et al. (1995) proposed that the Dongjun Fauna was comparable with those of the Sharamurian and that the mammals from the Nadu and Gongkang formations were treated as a single Nadu Fauna. They named the Naduan as one of the Chinese Paleogene mammal ages and correlated it to the European Late Bartonian and the North American Duchesnean as the latest Middle-Late Eocene. Thus the suoid fossils from Bose and Yongle basins represent the earliest known fossil records of Suoidea in the world.

The suoid specimens described herein are the unpublished material found by Savage et al. In 1999, Tong Yongsheng agreed the author to study these teeth. The terminology used in this paper mainly follows Pickford (1988) and Hünemann (1968). The measurements are taken using the method of Hünemann (1968, 1999).

2 Systematic paleontology

Order Artiodactyla Owen, 1848

?Family Suidae Gray, 1821

Genus *Eocenchoerus* nov.

Type species *Eocenchoerus savagei* gen. et sp. nov.

Diagnosis As the type species.

Etymology Eocen: Eocene; choerus: pig.

***Eocenchoerus savagei* gen. et sp. nov.**

(pl. I, 1~2)

Holotype A right M3 (IVPP V 7885).

Referred specimen A right P4 (IVPP V 7884).

Age and locality Latest Middle-Late Eocene, Gongkang Formation. V 7884 from south of Wanjiang Village, Bose County (Loc. 73091); V 7885 from south of Politun Village (Loc. 83082) and about 400 meters west of Loc. 73091.

Diagnosis A medium sized suid, with four bunodont cusps and a talon on M3. Differing from other suids in having primitive dentition: P4 only has one labial cusp; M3 lacking all accessory cusps and Furchen, lingual cusps larger than labials, and with a labial talon. Differing from the palaeochoerids in having a developed talon on M3, and lacking the posterior cingulum.

Etymology The species is named after Mr. Donald E. Savage, who participated in the field and unpublished research work.

Comparison and classification P4 is short and wide ($8.8 \times 12.8\text{mm}$), giving an outline of a rectangle. The tooth is worn at a considerable degree, main cusps are worn down to the level of cingulum. Isolated worn pits on the tops of main cusps show that the lateral crew movement of this suid is limited. There is only one cusp on the lingual side as on the labial judging by the narrow labial area. An anterior crest exists between the two cusps. The anterior and posterior cingula are broad but are not extended to the labial or lingual sides of the tooth. A small accessory cusp stands at the middle of the posterior cingulum. Three roots are present, a large one on the lingual side and two small ones on the labial side. The enamel is very smooth and thick.

M3 is almost unworn. It consists of four cusps and a small talon. The labial cusps are much larger and more anterior than the lingual ones. The metacone is the smallest and lowest main cusp. The protocone and paracone are very smooth on the surface, while the hypocone and metacone bear some short ridges. The anterolabial crest extending from the hypocone is quite strong, making the cusp less selenodont in crown view. The anterior cingulum is long and strong, it extends to the labial corner of the tooth. There is no anterior accessory cusp, but a longitudinal crest exists between the anterior cingulum and the protocone. No posterior cingulum is present. The talon is smaller and much lower than main cusps, and stands posterior to the metacone. Thus the labial side of the tooth is slightly longer than the lingual side. No root is preserved.

Among primitive bunodont artiodactyls, the low and round cusps on the M3 resemble the teeth of entelodonts. Chow (1958) described a primitive entelodont, *Eocentelodon yunnanense*, from the Late Eocene of Yunnan, China. Its size is near the M3 assigned to *Eocenchoerus*. The M3's morphology of *E. yunnanense* is unknown by far, but its M1 has six cusps, three on the anterior moiety and three on the posterior. The M3 of its descendant, *Entelodon*, is rounded triangular and is quite short; the anterior two cusps are larger and higher than the posterior pair; the cingulum surrounds the entire tooth (Effinger, 1998). These features are different from those of the elongated M3 of the new taxon whose lingual cusps are larger and whose cingulum is only present at the anterior end. Therefore the M3 does not look like an entelodont tooth.

Another primitive artiodactyl from the Middle-Upper Eocene of Western Europe, *Cebochoerus*, once suggested as an ancestor for Suidae (Pearson, 1927) has incipient selenodont upper molars. The labial cusps of the upper molar are joined together by a crest, whereas the lingual cusps tend more selenodont and the cingulum is little developed (Viret, 1961). The M3 of *Eocenchoerus* has isolated labial cusps, a rounded protocone and a wide anterior cingulum, thus differs from that of *Cebochoerus*.

The new material is identified as a suoid by its overall bunodont cusp tooth and a talon on M3. The remnant selenodont hypocone supports the suggestion that bunodont (neobunodont) molar derived from the bunoselenodont molars (Hünemann, 1999).

Up to now, the known taxa whose P4 has one labial cusp are some primitive Paleogene suoids, including *Palaeochoerus typus* (Hellmund, 1992, Pl. 2, Fig. 1), *Helohyus* and *Perchoerus* (Pearson, 1923, Fig. 15, a~c). But in those taxa, the labial cusp of P4 is more developed so that the tooth is triangle in outline. Liu et al. (in press) discussed that the single labial cusp on P4 is a primitive character, in contrast to the two well-separated labial cusps in later suoids. The last molar of *Eocenchoerus* is quite special compared to that of palaeochoerids. It is long and lacks a posterior cingulum, but has a distinct talon. It can not be related to any primitive palaeochoerid taxa that do not have the talon at all. The absence of accessory cusps and the different-sized main cusps also differentiate V 7885 specimen from the known suids. The author therefore erects a new genus for it.

The new genus *Eocechoerus* has very primitive molars, absence of Furchen and accessory cusps, and smaller labial cusps; it is thus much different from the later suids whose molar has nearly equal sized main cusps, developed accessory cusps, and deep Furchen. It is more concordant to palaeochoerid dentition (Pickford and Morales, 1989; Van der Made, 1996). Although the position of the heel cusp is not normal for suid, it is treated as a talon. Since the talon is never present in the New World

peccaries and Old World palaeochoerids (only a developed posterior cingulum instead of a talon) but occurs in almost all Old World suids (listriodont is an exception), the presence of talon on M3 is a synapomorphic character for suids. Therefore the talon structure in M3 of the new species suggests its Suidae affinity.

But the position of the new genus's talon is quite special for a suid. In the later suids, the talon of M3 occurs centrally or lingually (the only exception is the specimen SMNS 44884, Hellmund, 1991, fig. 2), so that the lingual length of M3 is always longer than the labial length in those taxa. In the new genus, the talon is present on the labial side of M3, and the labial length is longer. With the only sample, it is difficult to know if the talon position is stable within species. But Pearson (1923) mentioned that number and position of the cusplets are variable within the same subspecies molars of recent peccary, especially the third molar. By far, none of any known artiodactyl has the talon on the labial side of M3. Thus *Eocenchoerus* is temporary assigned to the Suidae.

Palaeochoeridae Matthew, 1924

Genus *Siamochoerus* Ducrocq, 1998

***Siamochoerus viriosus* sp. nov.**

(pl. I, 3)

Holotype Right m1~m3 (IVPP V 7881).

Referred specimen an anterior part of a right molar (IVPP V 7881.1).

Age and locality Latest Middle-Late Eocene, Nadu Formation. Type specimen V 7881, from north of Quelin Village (Loc. 74067(83)), V 7881.1, from north of Futang Village (Loc. 73080(83)), Tiandong County, Guangxi.

Etymology The Latin word "viriosus" means strong, indicating the strong cusps of the new species.

Diagnosis A larger species of *Siamochoerus*. Sharing with the type species the following character states: lower molars increasing in size from front to back, bearing strong crests between main cusps, a small hypoconulid, extremely weak tubercle in transverse valley, and coarse enamel surface.

Description Three isolated molars (V 7881), which were found together and are compatible in size and morphology, can be considered as one individual. They are almost unworn, but no root is preserved in any of them.

The m1: the anterior part is broken, the structure of the posterior half is same with the part of m2.

The m2: the tooth consists of four stout and robust main cusps. The tops of protoconid and metaconid stand closely, and are connected to each other by each low anterior and posterior ridges to form a small basin. Another posterior ridge from the two cusps runs longitudinally downward to the transverse groove. The two rear cones stand in line, and are connected to each other by a low transverse ridge. The

hypoconid has an anterior ridge to the center of transverse groove of the tooth, and swells at the base as a small tubercle. The tubercle increases in size from m1 to m3. The enamel of the molar is slightly wrinkled and looks quite coarse, but the fine wrinkle does not get to the extent to be regarded as Furchen. The thin anterior cingulum occurs under the anterior basin rim, whereas the posterior one is strong and consists of several enamel nodes, with a small hypoconulid lying in the center. From the lateral view, the anterior cusps are higher than the posterior pair.

The m3: the structure is same with that of m2, only the oblique ridge from the hypoconid inflates as a bigger tubercle, but still far from being a salient median accessory cusp. The tooth loses its anterolabial corner, and breaks at its hinder part, therefore the talonid morphology is unknown.

Discussion It is clear that the above material belongs to a primitive suoid by the presence of a small hypoconulid, poorly developed Furchen, and a small tubercle in the middle sagittal groove of m3. The unambiguous suid *Hyotherium* and other more derived suid taxa differ from *E. viriosus* by having well-developed accessory cusps and moderate to deep Furchen. Different to most primitive palaeochoerids, such as *Palaeochoerus*, *Propalaeochoerus*, *Egatochoerus* and *Taucanamo*, the new material is larger in size and complicate in morphology expressed by more developed ridges.

The *Odiochoerus uniconus* (Tong and Zhao, 1986) from the same area is too small to be the new species (Table 1), but its basic structures are very close to the above described specimens. Teeth of the two genera are similar in having the crest basin between the anterior cusps, the downward ridges from the posterior face of the metaconid and protoconid, the slightly swollen end of the ridge from the entoconid to the center of transverse groove, and the poorly expressed Furchen. In addition to the much smaller size, *Odiochoerus uniconus* is special by its more thin and smooth enamel, the relatively weak ridge, the isolated rear cusps, and the prominent hypoconulid in the lower molars.

In contrasting, the similarities between the described material and *Siamochoerus banmarkensis* from Thailand (Ducrocq et al., 1998) are much obvious. They all have the transverse crest between the hinder main cusps, thick enamel and wrinkled surface, and similar ridges on the cusp surfaces.

The new material is obviously larger (1.5 times) than *S. banmarkensis* (table 1). No significant morphologic difference can be found between them. The author assign the new material to the same genus, and create a new species name based on the large size and geographic distribution.

The referred V 7881.1 specimen is an anterior half of a lower molar. The crest basin between the protoconid and metaconid is not present by the lack of the anterior connecting crest. A weak anterior crest extends from the protoconid, and leads lingually to the middle anterior base of the metaconid. The posterior crest connecting

the protoconid and metaconid exists. The posterior faces of the anterior cusps have been eroded, but the longitudinally downward crest from the metaconid remains notable. There is a very low and wide tubercle in the middle of the wide transverse groove. The enamel is wrinkled, but much smoother than that of the type specimens. The anterior cingulum is thicker than the type, and the width of anterior moiety is 16.6mm. Although the referred V 7881.1 specimen shows different degree of wrinkled enamel and crests, and is larger than the type, it should be included in the same species because these differences are due to the different ages of the two individuals. The V 7881.1 belongs to an adult while the V 7881 comes from a young individual.

Table 1 The measurements of the lower teeth of *Siamochoerus viriosus* in comparison with *Odiochoerus uniconus* and *Siamochoerus banmarkensis* (mm)

	Taxa	Length	Width		
			Anterior-trigonid	Posterior-trigonid	Talonid
M1	1	8.3	5.5	5.3	
	2	10.9	7.9	7.6	
	3	17.5	11.7	—	
M2	1	10.1	6.4	6.0	
	2	13.8	10.2	9.4	
	3	20.5	14.4	14.5	
M3	1	>11.5	6.7	6.1	—
	2	18.7	10.5	—	8.4
	3	—	>15.2	13.8	—

1 = *O. uniconus*, from Sanlei, Quelin, Guangxi Province, China.

2 = *S. banmarkensis*, from Bang Pu Dam, Thailand (measurements following Ducrocq et al., 1998).

3 = *S. viriosus*, from Tiandong, Guangxi Province, China.

Huaxiachoerus gen. nov.

Type species *Huaxiachoerus guangxiensis* gen. et sp. nov.

Diagnosis As the type species.

Etymology "Huaxia" means China.

Huaxiachoerus guangxiensis gen. et. sp. nov.

(pl. I, 4~5)

Type specimen Right M2~M3 (IVPP V 7883).

Referred specimen A right M2 (IVPP V 7883.1).

Age and localities Latest Middle-Late Eocene, Nadu Formation; V 7883 specimen from northeastern Quelin Village (Loc. 73086(83)); V7883.1 from north of Quelin Village (Loc. 74067(83)), Tiandong County, Guangxi.

Etymology "Guangxi" is the Province of the locality.

Diagnosis A primitive palaeochoerid differing from other palaeochoerids in upper molar morphology: elongated teeth, metaconid obviously smaller than other main cusps,

main cusps pointed, and in a more elongated M3. Differing from tayassuids in lacking secondary cusps in their longitudinal groove of upper molars.

Description and discussion Small sized suoid. The type specimens are deeply worn. The referred M2 ($10.8 \times 10.6\text{mm}$) is slightly worn. The M2 have four high and conical cusps. The lingual cusps are larger than labial ones because of the lingual expansion of the protocone and hypocone. Labial cusps are slightly anterior than the lingual pair and possess faint longitudinal ridges. The ridges lie only on the face of cusps and do not connect to each other, so that the transverse groove opens at the labial side. The anterolabial crest from protocone terminates in the cingulum anterior to the paracone. An anterolabial crest from the hypocone ends at the central valley. The short labial crest of the hypocone runs toward the metacone, but is separated from the latter by longitudinal valley. The broad cingulum develops on the anterior end of the tooth and extends to the inner corner of the protocone. A remnant cingulum is also found at the labial central position of the tooth. The posterior cingulum is short and runs upward to the hypocone. The type M3 ($10.4 \times 9.3\text{mm}$) is essentially identical to the type M2 ($10.9 \times 10.8\text{mm}$) in morphology, but is a bit smaller and more elongated. It is distinctly narrow on the hinder moiety because of the reduced metacone. The posterior cingulum is poorly developed: it is quite short and bears a small enamel node. The separated worn surfaces of the four main cusps suggest that the lateral and longitudinal chew movements are all limited. The inner roots fuse together and the labial ones remain separated.

The upper molars are basically quadritubercular bunodont teeth, typical of a primitive suoid. These teeth are very primitive: M3 is smaller than M2; the upper molars, especially M3, contract obviously at the hinder moiety because of the weak metacone; lingual cusps are larger than the labials. These characters are common in primitive suoids, such as *Perchoerus*, *Palaeochoerus typus*, *Propalaeochoerus pussilus* and *Siamochoerus banmarkensis*.

The molars of the New World genus *Perchoerus* are much complicated with the intermediate cusps between the lingual and labial main cusps. The new material differs from the Old World genera *Palaeochoerus*, *Propalaeochoerus* and *Siamochoerus* in having the conical main cusps (in contrast to the round bunodont cusp), elongated upper molar (opposite to the short and much wider molar) and much short posterior cingulum on M3 (opposite to the well developed posterior cingulum).

Cynorca sociale, a similar sized tayassuid found from the Miocene of the New World, has a close morphology in upper molars, but the posterior and labial cingula on M3 are much more developed. Woodburne (1969) considered this species at the base of the second evolutionary radiation of the Tayassuidae. The intermediate cusplets on its upper molar are absent or incipient, therefore it is more similar to the new material than to the well-known New World peccary *Perchoerus* (the base member of

the first evolutionary radiation).

The size of the new species is near that of *Odiochoerus uniconus*. But the latter was erected based solely on lower dentition. Tong and Zhao (1986) compared the two specimens and suggested that they are not the same species. Without better material, it is difficult to give further comparison between these specimens. The thick enamel on the new upper molars is different from the thin enamel seen on the lower teeth of *O. uniconus*, indicating that the new material belongs to a different taxon.

Tayassuidae gen. et sp. indet.

(pl. I, 6)

Material A?M2(IVPP V 7882).

Age and locality Latest Middle-Late Eocene, ?Nadu Formation, north of Futang Village, Tiandong County (Loc. 73083).

Description and discussion The tooth is moderately worn and is nearly square in outline. The bases of the four rounded cusps fuse with each other, and the grooves between them are quite shallow. The anterior and central accessory cusps are present in their usual position as in most suoids and fuse to the posterior cusps (the anterior one to the protocone, the middle one to the hypocone). There is another cusplet between the rear main cusps. Furchen is poorly expressed. The anterior and posterior cingula are developed. The labial cingulum is weak, except at the outside of the transverse groove. Roots are not preserved, but it is clear that the lingual two have fused to each other.

The tooth is too small ($14.8 \times 13.5\text{mm}$) to be assigned as *Siamochoerus viriosus* and too large to fit to other taxa found in Bose and Yongle basins. Compared to the correspondent upper molars of *Siamochoerus banmarkensis* from Krabi, it is clearly different to them. These Thailand teeth are short and wide (M3: $13.7 \times 14.6\text{mm}$), and lack well-defined accessory cusps (Ducrocq et al., 1998). The upper molars of *Egatochoerus jaegeri* from Krabi (Ducrocq, 1994) are smaller and have developed intermediate cusplets in the longitudinal groove; the main cusps are much pointed, easy to differentiate from the tooth described above. By the accessory cusps that fuse to main cusps, it is easy to differ the new molar from other suids that have isolated accessory cusps. V 7882 specimen is slightly larger than the molars of *Palaeochoerus typus* and *Propalaeochoerus pusillus* (Hellmund, 1992), but the size difference is still in a reasonable range. Compared with the former two genera, the tooth is special at the cusplet positioning between the transverse main cusps, which is only found in *Egatochoerus* and the New World tayassuid taxa. So the single upper tooth is more likely to be from a tayassuid.

3 The Old World Palaeochoeridae

For a long time, the distinction between the Suidae and Tayassuidae is unclear.

The key discrepancy lies in the familial status of Palaeochoerinae. The dental characters used to define the Palaeochoerinae are plesiomorphic (primitive), which equally support their assignment either to Tayassuidae or to Suidae. More and more authors realized that the differences between the primitive Old World "peccary" and the New World peccary are very clear. Dechaseaux (1959) compared the skull of *Doliochoerus* (*Propalaeochoerus*) with the New World taxa *Perchoerus* and *Dicotyles*, and rejected their close relationship. Tong and Zhao (1986) compared the dentition of the Old World "peccary" with the New World peccary and inferred that the Old World peccary-like suoids are not typical peccaries. Wright (1998) mentioned that the alliance between the Old World "tayassuids" and North American tayassuids is not based on synapomorphy, and that at least some of the Old World species in question share apparent apomorphies with suids.

Van der Made (1996, 1997, 1998) resumed the family Palaeochoeridae (Matthew, 1924) to group the Old World palaeochoerids. The author thinks it is more reasonable to assign the palaeochoerids to Palaeochoeridae than to Tayassuidae, which is a group obviously distinct to the Old World palaeochoerids by having the molarized premolars, the complicated upper molars, and many unique skull structures that are not involved in this paper.

Ducrocq et al. (1998) erected the new genus *Siamochoerus* and believed it to be a suid. But the upper teeth associated to the lower mandible are notably wide and short, and do not have the talon and any accessory cusps. In addition, a tubercle locates in the median groove of lower molar, but it is not distinct enough to be an accessory cusp. The author think it is closer to *Palaeochoerus* than to *Hyootherium*, and is better to be included in the family Palaeochoeridae. The new genus *Huaxiachoerus* is assigned to this family, as well.

4 The origin of Suidae and split of suoids

Although *Eocentrochoerus* differs from the typical suids obviously, it is still more similar to suids than to other artiodactyls. Either it is indeed a suid or a sister member of suid, the history of Suidae is thus shifted to as early as Eocene. Normally, paleontologists believe that Suidae split out later than Palaeochoeridae and Tayassuidae, and that suid is a successive group of palaeochoerid. These conclusions are based on the knowledge that Suidae is an advanced group, and appeared much later than the other two groups. But the earliest suid taxon *Eocentrochoerus*, which is found together with the first palaeochoerid and tayassuid and has a primitive dentition, suggests the origin of Suidae as early as that of Palaeochoeridae and Tayassuidae.

The suoid collection from Guangxi consists only several isolated teeth, but it indicates a diversified suoid group. Four more taxa are identified and all the families (Suidae, Tayassuidae, Palaeochoeridae) of Suoidea have their first members. The

similar suoid group found from Krabi of Thailand illustrates the close geographic connection with Southern China and strengthens the important role of southeastern Asia as the original center of suoids. The well diversified Asian Eocene suoids give a suggestion that the split of Suidae, Palaeochoeridae and Tayassuidae might begin at about the Middle Eocene or earlier period.

5 The immigration events of Suoid in the New World

The tayassuid material in Guangxi collection is only represented by a single tooth, but adds the record to the Old World tayassuid. Woodburne (1969) recognized two major evolutionary radiation for the New World tayassuids, their root genera are *Perchoerus* from the late Eocene and *Cynorca* from the Oligocene. Based on the dentition structures, *Cynorca* is very close to *Huaxiachoerus* while *Perchoerus* could be compared with *Egatochoerus*. The immigrations of suoids from the Old World to the New World are very clear. The ancestors of the New World tayassuids root among the Old World suoids that have the similar dentition as that of *Egatochoerus* and *Huaxiachoerus*.

6 Conclusion

1) Two new genera and species, one new species and one indeterminate species are described from the Bose and Yongle Basins. If *Odiachoerus* is included, five suoid taxa have been found from the Chinese Eocene. They are the earliest known suoids of the world by far.

2) The dental structure of the new genus *Eocenchoerus* is quite simple and concordant with palaeochoerids, but the occurrence of the talon on M3 suggests *Eocenchoerus* should be a suid taxa. The Eocene suid indicates the origin of the Suidae as early as that of Palaeochoeridae and Tayassuidae.

3) The family Palaeochoeridae is accepted to unit the Old World peccary-like suoid, two genera *Siamochoerus* and *Huaxiachoerus* are assigned to it.

4) The New World tayassuids clearly emigrated from the Old World taxa, which have a similar dentition as that of *Egatochoerus* and *Huaxiachoerus*.

5) Suid, palaeochoerid and tayassuid coexisted in the Late Eocene of Southern China, it is possible that the split period of suoids occurred before the Middle Eocene.

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Explanations of Plate I

萨氏始新猪(新属、新种) *Eocenchoerus savagei* gen. et sp. nov.

1. Right P4 (V 7884), about $\times 2$; 2. Holotype specimen, right M3 (V 7885), about $\times 2$

粗壮暹罗猪(新种) *Siamochoerus viriosus* sp. nov.

3. Holotype specimen, right m1~m3(V 7881), about $\times 1$

广西华夏猪(新属、新种) *Huaxiachoerus guangxiensis* gen. et sp. nov.

4. Right M2 (V 7883.1), about $\times 2$; 5. Holotype specimen, right M2~M3(V 7883), about $\times 2$

西猪科属种未定 Tayassuidae gen. et sp. indet.

6. Left M2?(V 7882), about $\times 2$

